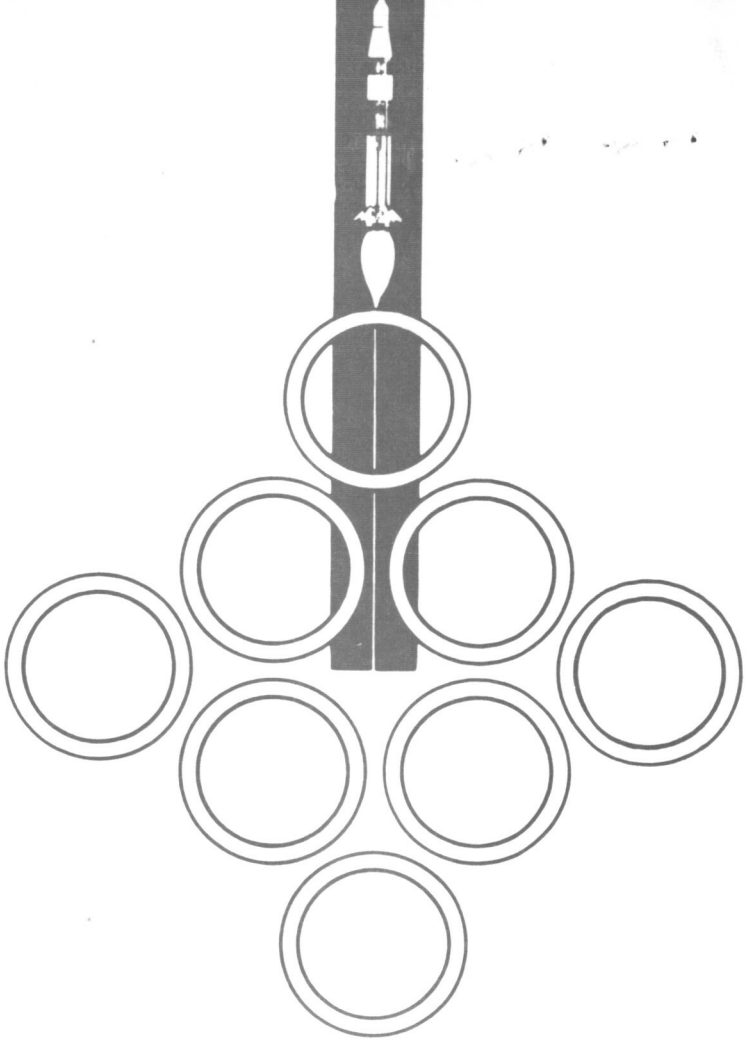

ENGINEERING DEPARTMENT

TECHNICAL REPORT

TR-RE-CCSD-FO-1032-3

April 30, 1967

SATURN IB PROGRAM

TEST REPORT
FOR

RELIEF VALVE, 1- BY 1 1/2-INCH, 100-PSIG

Manning, Maxwell, and Moore Model Number 1970C Special

NASA Drawing Number 75M17763 HRV-9

SPACE DIVISION CHRYSLER CORPORATION

TEST REPORT

FOR

RELIEF VALVE, 1- BY 1 1/2-INCH, 100-PSIG

Manning, Maxwell, and Moore Model Number 1970C Special

NASA Drawing Number 75M17763 HRV-9

ABSTRACT

This report presents the results of tests performed on two specimens of 1- by 1½-inch, Relief Valve 75M17763 HRV-9. The following tests were performed:

1. Receiving Inspection
2. Functional
3. High Temperature
4. Surge
5. Cycle
6. Proof Pressure

The specimens met the requirements of the John F. Kennedy Space Center. The performance of the specimens was in accordance with specification requirements of NASA drawing 75M04047 HRV-2 and 75M17763 HRV-9.

The specimen specification was changed to 75M17763 HRV-9 after the surge test. This specification requires a set pressure of 90 (+3, -0) psig. Prior to the cycle test both specimens were reset to the new relief pressure using GN_2 at ambient temperature.

During the cycle test the cracking pressure of both specimens was above 93 psig when measured with LH_2 following each 100 cycles. This high cracking pressure is attributed to the low temperature of the specimens. Following the cycle test, the cracking pressures when measured again at ambient were within the specified limit of 90 (+3, -0) psig. The increase in cracking pressure caused by low temperature is not considered detrimental but indicated that the set pressure must be temperature compensated.

TR-RE-CCSD-FO-1032-3

TEST REPORT

FOR

RELIEF VALVE, 1- BY 1 1/2-INCH, 100-PSIG

Manning, Maxwell, and Moore Model Number 1970C Special

NASA Drawing Number 75M17763 HRV-9

April 30, 1967

CHRYSLER CORPORATION SPACE DIVISION - NEW ORLEANS, LOUISIANA

FOREWORD

The tests reported herein were conducted for the John F. Kennedy Space Center by Chrysler Corporation Space Division (CCSD), New Orleans, Louisiana. This document was prepared by CCSD under contract NAS 8-4016, Part VII, CWO 271620.

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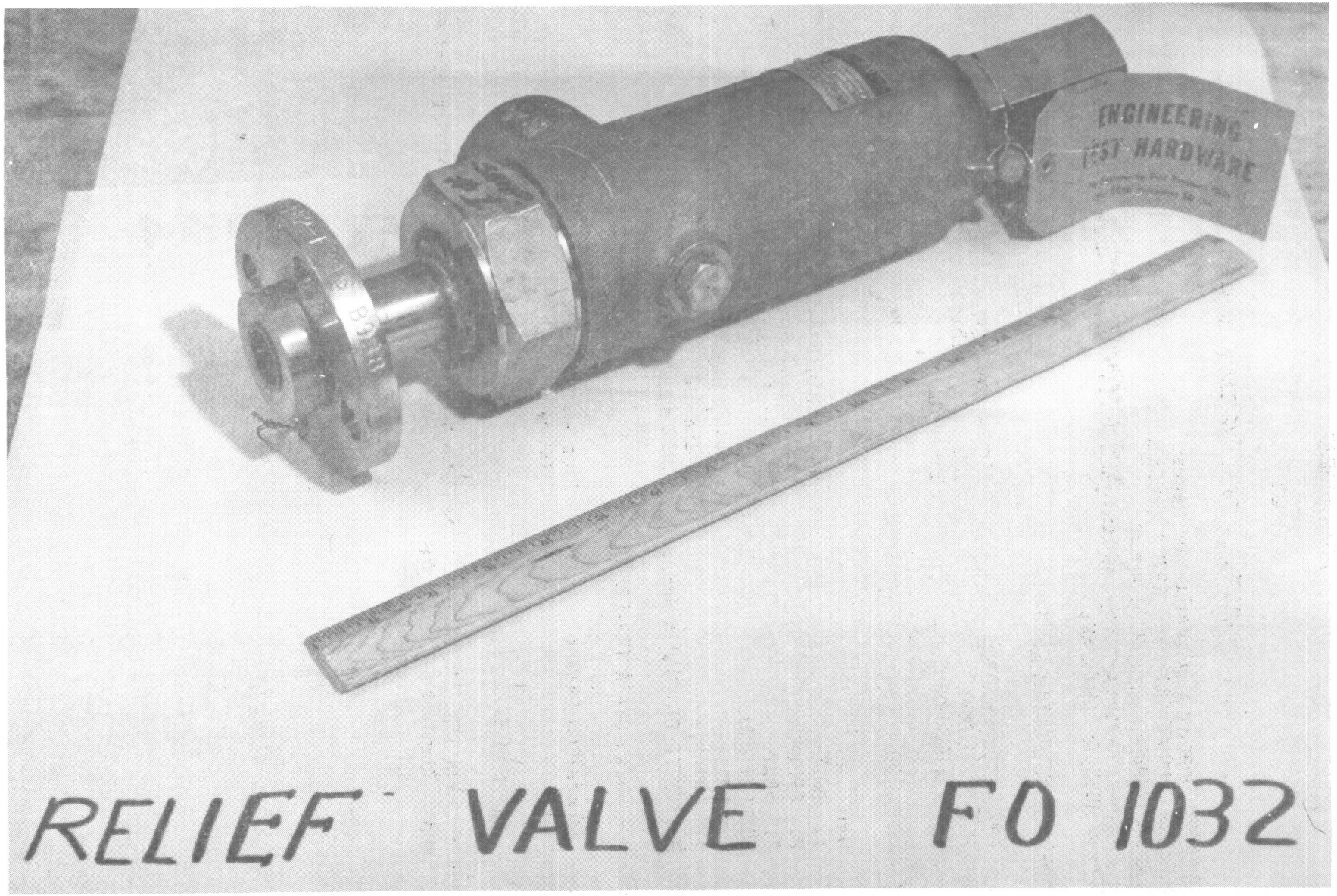


Relief Valve, 75M17763 HRV-9

CHECK SHEET

FOR

RELIEF VALVE, 1- BY 1 1/2-INCH, 100-PSIG

MANUFACTURER: Manning, Maxwell, and Moore
MANUFACTURER'S MODEL NUMBER: 1970C Special
NASA DRAWING NUMBER: 75M17763 HRV-9
TESTING AGENCY: Chrysler Corporation Space Division, New Orleans, Louisiana
AUTHORIZING AGENCY: NASA KSC

I. FUNCTIONAL REQUIREMENTS

A.	OPERATING MEDIUM:	Liquid hydrogen
B.	SET PRESSURE:	100 psig (ambient)
C.	PROOF PRESSURE:	135 psig

II. CONSTRUCTION

A.	MATERIALS:	
	1. BODY:	18-8 stainless steel
	2. SPRING:	18-8 stainless steel
	3. SEAT:	18-8 stainless steel
B.	CONNECTIONS:	
	1. INLET:	1-inch, 150-lb Texmet flange
	2. OUTLET:	1½-inch NPT
C.	EFFECTIVE DISCHARGE AREA:	0.442 square inches

III. ENVIRONMENTAL CHARACTERISTICS

A.	TEMPERATURE RANGE:	From -423 to +125°F
B.	CYCLE:	1000 cycles

IV. LOCATION AND USE

Relief Valve 75M17763 HRV-9 is used in the liquid hydrogen transfer system of Launch Complexes 34 and 37B.

Test Summary

Environment	Operation and Boundary	Test Objective	Units	Test Results	Remarks
Receiving Inspection	Compliance with NASA and vendor drawings	Check for conformance with NASA and vendor drawings	2	Satisfactory	No evidence of poor workmanship or manufacturing defects
Functional Test	Cracking pressure, rainfall for 30 minutes	Determine cracking and reseating pressure using LH_2. Check for internal and external leakage. Determine if specimen operation with LH_2 is impaired by rainfall.	2	Satisfactory	LH_2 cracking and reseating pressures were determined. There was no internal or external leakage. Specimen operation with LH_2 was not impaired by rainfall.
High Temperature Test	+125°F	Determine if specimen operation is impaired by high temperature.	2	Satisfactory	Specimen operation was not impaired by high temperature.
Surge Test	60% to 110% of cracking pressure within 100 milliseconds	Determine if specimen operation is impaired by surge	2	Satisfactory	Specimen operation was not impaired by surge.
Cycle Test	500 crack-reseat cycles	Determine if specimen operation is impaired by cycling	2		Cracking pressure of both specimens was above the specified maximum when set at ambient conditions.
Proof Pressure Test	135 psig	Check for leakage and distortion	2	Satisfactory	No leakage or distortion

SECTION I

INTRODUCTION

1.1 SCOPE

1.1.1 This report presents the results of tests performed to determine if Relief Valve 75M17763 HRV-9 meets the operational and environmental requirements of John F. Kennedy Space Center Launch Complexes 34 and 37B. A summary of test results is presented on page vii.

1.2 ITEM DESCRIPTION

1.2.1 Two specimens of Relief Valve 75M17763 HRV-9 were tested.

1.2.2 The relief valve is manufactured by the Manning, Maxwell and Moore Company. The valve is used as a liquid hydrogen pressure relief valve in a liquid hydrogen transfer system, and is set to relieve pressure at 90 psig. The inlet size is 1-inch, the outlet size is 1½-inches, and the effective discharge area is 0.442 square inch. The valve is 13 3/4-inches high and weighs approximately 20 pounds.

1.3 APPLICABLE DOCUMENTS

The following documents contain the test requirements for Relief Valve 75M17763 HRV-9.

a. KSC-STD-164(D), Standard Environmental Test Methods for Ground Support Equipment Installations at Cape Kennedy

b. NASA Drawing 75M17763 HRV-9

c. MSFC Cleaning Specification 164

d. Test Plan CCSD-FO-1032-1R

e. Test Procedure CCSD-FO-1032-2R

f. Revision B - Test Plan CCSD-FO-1032-1R

SECTION II

RECEIVING INSPECTION

2.1 REQUIREMENTS

The test specimens shall be visually and dimensionally inspected for conformance with the applicable specifications prior to testing.

2.2 PROCEDURE

A visual and dimensional inspection was performed on the specimens to determine compliance with NASA drawing number 75M04047 HRV-2 and 75M17763 HRV-9 and the applicable vendor drawing to the extent possible without disassembly. At the same time the specimen was inspected for poor workmanship and manufacturing defects.

2.3 TEST RESULTS

The test specimens complied with NASA drawing number 75M04047 HRV-2 and 75M17763 HRV-9 and the applicable vendor drawing. No evidence of poor workmanship or manufacturing defects was observed.

2.4 TEST DATA

The data presented in table 2-1 were recorded during the inspection.

Table 2-1. Specimen Specifics

Manufacturer	Manning, Maxwell and Moore
Size	1 by 1½-inch
Model	1970C special
Serial Number:	
Specimen 1	TP 95283
Specimen 2	TP 95282
Length	16 3/8-inches
Outside Diameter	5½-inches
Connections:	
Inlet	1-inch, 150-pound Texmet flange
Outlet	1½-inch pipe

SECTION III

FUNCTIONAL TEST

3.1 TEST REQUIREMENTS

3.1.1 The test specimen shall be checked for internal and external leakage.

3.1.2 The cracking and reseating pressures of the test specimen shall be determined using LN_2 or LH_2 as the test media.

3.1.3 The specimen shall be exposed to a simulated rain atmosphere during the initial functional test only, and the cracking and reseating pressure of the test specimen shall be determined.

3.2 TEST PROCEDURE

3.2.1 The test setup was assembled as shown in figures 3-1 and 3-2 using the equipment listed in table 3-1. All valves and regulators were closed.

3.2.2 Pneumatic valves 2 and 3 and hand valve 14 were opened. Using regulator 9 the GN_2 pressure was increased until specimen cracking pressure was reached. Cracking pressure was indicated by violent bubbling in lab tray 21. Valve 13 was opened and the pressure was reduced to zero. This constituted one cycle. Three cycles were performed.

3.2.3 Pressure regulator 9 was adjusted to set the GN_2 pressure at 17 psig as indicated on gage 10. The specimen was checked for internal leakage by observing lab tray 21 for 3 minutes. Maximum internal leakage allowable is 3 bubbles per minute. The specimen was checked for external leakage by applying a soap solution to the exterior of the specimen. No external leakage is allowed. The pressure was reduced to zero.

3.2.4 Regulator 9 was adjusted to establish a pressure of 100 psig as indicated on gage 10. Valves 2, 3, and 13 were opened and the system was purged for 3 minutes. All hand valves and regulators were closed.

3.2.5 Using regulator 17, hydrogen dewar 16 was pressurized to 100 psig with helium as indicated on pressure gage 15. Pneumatic valve 12 was opened. Pneumatic valve 5 was opened and LH_2 was allowed to flow through the specimen. The flow was maintained until the specimen temperature reached -423°F. The pressure was then reduced to zero.

3.2.6 Pneumatic valve 13 was closed. Hand valve 14 was opened. Using regulator 17, the pressure was slowly increased until the specimen cracking pressure was reached. The cracking pressure was recorded. The pressure was increased to 110 per cent of cracking pressure then was reduced to zero. The reseating pressure was recorded.

3.2.7 Procedure 3.2.6 was repeated as necessary to obtain consistent data.

3.2.8 Valve 5 was closed. Purge procedure 3.2.4 was repeated.

3.2.9 The tube from the specimen exit port was disconnected and a 90-degree elbow was installed with openings pointed down before exposing the specimen to the simulated rainfall. Hand valve 7 was adjusted to simulate a rainfall of 1-inch per hour impinging on the specimen. The simulated rainfall was maintained for 30 minutes.

3.2.10 Procedures 3.2.5 and 3.2.6 were performed three times using LH_2 as the test medium.

3.2.11 Procedures 3.2.9 and 3.2.10 were performed during the initial functional test only.

3.3 TEST RESULTS

3.3.1 The specimens did not exhibit any internal or external leakage.

3.3.2 The specimens successfully met the cracking and reseating requirements.

3.3.3 The specimens successfully met the cracking and reseating requirements while subjected to a simulated rain atmosphere.

3.4 TEST DATA

The data presented in tables 3-2 and 3-3 were recorded during the initial functional test.

Table 3-1. Functional Test Equipment List

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Test Specimen	Manning, Maxwell, and Moore	1970C Special		1- by 1½-inch relief valve
2	Pneumatic Valve	Hoke	30201-1		¼-inch
3	Pneumatic Valve	Hoke	30201-1		¼-inch
4	Pressure Transducer	C. E. C.		95-1116-B	0-to 200-psig ±0.1% FS Cal date 12-22-66
5	Pneumatic Valve	Hoke	30201-1		¼-inch
6	Oscillograph	C. E. C.	NA	012592	Cal date 12-27-66
7	Hand Valve	Hoke	PY273	NA	½-inch
8	Heater	Chromalox	NA	NA	Tube heater
9	Pressure Regulator	Victor			0-to 500-psig
10	Pressure Gage	USG	Super-Gage	106-1119-B	0-to 200-psig ±1% FS Cal date 10-7-66
11	Relief Valve	Mission	40-2-T62		Set at 160-psig
12	Pressure Regulator	Fisher	NA	4140132	0-to 500-psig
13	Pneumatic Valve	Hoke	30201-1	NA	¼-inch
14	Hand Valve	Control Components		NA	¼-inch
15	Pressure Gage	Heise		08-113-1066-C	0-to 100-psig ±0.1% FS Cal date 12-14-66
16	Hydrogen Dewar	Cryenco	195-L	1158-19	42- gal capacity
17	Pressure Regulator	Victor	701N	8699S4	0-to 250-psig
18	Pressure Gage	Victor	30-205-202		0-to 4000-psig

Table 3-1. Functional Test Equipment List (Continued)

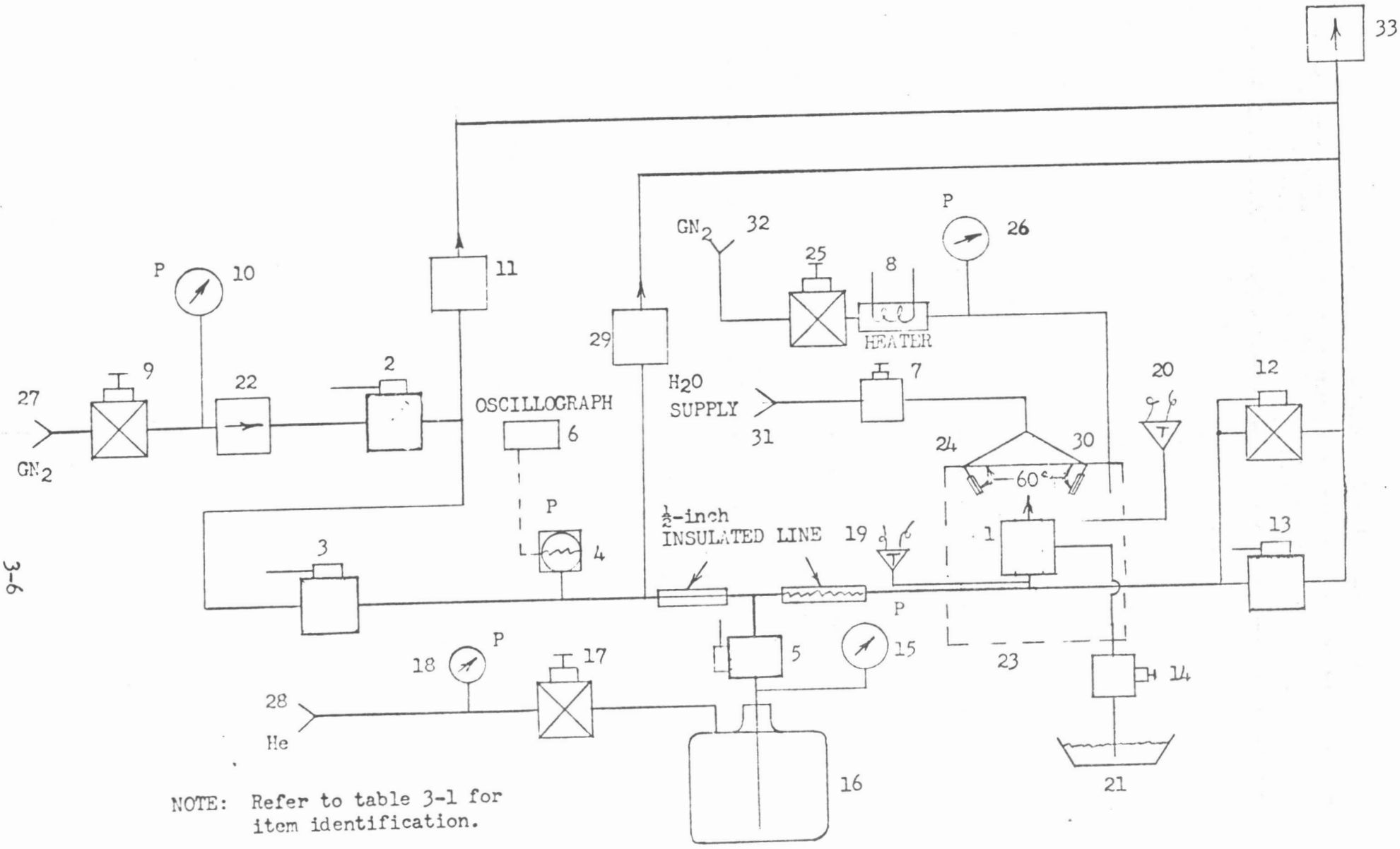
Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
19	Temperature Probe	Rosemount	150MP32	6454	-403 to -433°F ±0.1% accuracy
20	Thermocouple	Honeywell	NA	NA	Copper-constantan ±1% accuracy
21	Lab Tray	CCSD	NA	NA	
22	Check Valve	Hoke	6214FSS	NA	½-inch
23	Temperature Chamber	CCSD	NA	NA	
24	Nozzle	Systems Spraying Co.	NA	NA	½-inch
25	Pressure Regulator	Victor	SR431	NA	0-to 500-psig
26	Pressure Gage	Ashcroft	Duragauge		0-to 500-psig ±1% FS
27	GN_2 Supply	CCSD	NA	NA	2000-psig
28	He Supply	Airco	NA	NA	1800-psig
29	Relief Valve				Set at 160-psig
30	Nozzle	Systems Spraying Co.	NA	NA	½-inch
31	H_2O Supply	CCSD	NA	NA	
32	GN_2 Supply	CCSD	NA	NA	
33	Check Valve	Lukenheiman	2144	NA	2-inch vertical

Table 3-2. Initial Functional Test Data

Specimen	Trial	Cracking Pressure (psig)	Reseating Pressure (psig)	Leakage Rate (bpm)
1	1	100.0	95.0	0
	2	100.0	95.0	
	3	100.0	95.0	
2	1	102.0	96.5	0
	2	102.0	96.5	
	3	101.5	96.0	

Table 3-3. Functional Test Data Obtained During Simulated Rainfall

Specimen	Trial	Cracking Pressure (psig)	Reseating Pressure (psig)
1	1	99.0	94
	2	98.5	93.0
	3	99.0	94
2	1	93.5	88.5
	2	94.0	89.0
	3	94.0	89.0



NOTE: Refer to table 3-1 for item identification.

All lines are 1/2 inch.

Figure 3-1. Functional Test Schematic

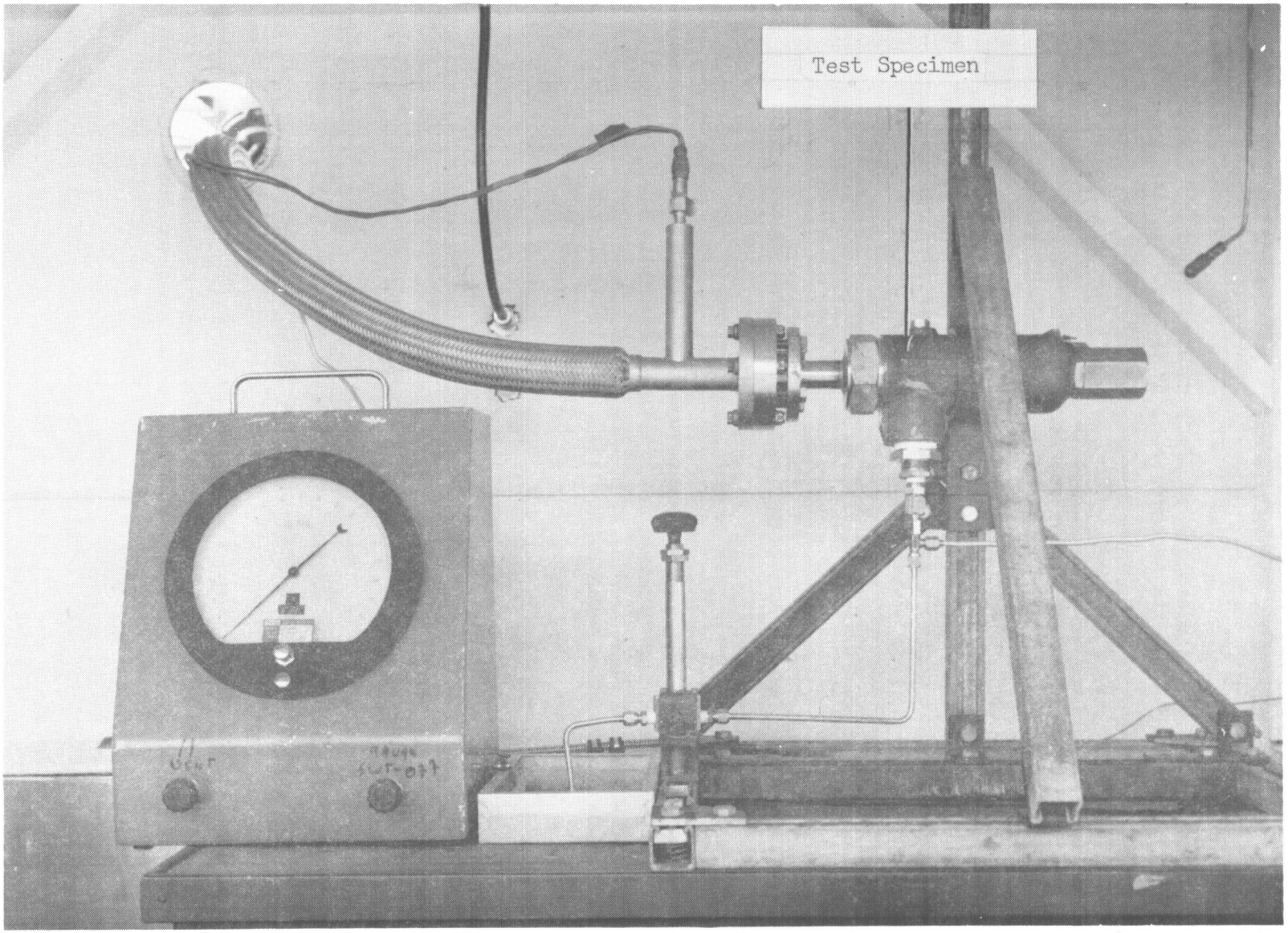


Figure 3-2. Functional Test Setup

SECTION IV

HIGH TEMPERATURE TEST

4.1 TEST REQUIREMENTS

4.1.1 The test specimen shall be subjected to a high temperature test at 125 (+5, -0)°F in accordance with KSC-STD-164(D), section 6, procedure I.

4.1.2 A functional test, as specified in paragraph 3.2.6 of section III, shall be performed during and after the high temperature test using LH_2 as the test medium.

4.2 TEST PROCEDURE

4.2.1 The test setup was assembled as shown in figures 3-1 and 3-2 using the equipment listed in table 3-1.

4.2.2 Thermocouple 19 was mounted on the surface of the specimen as shown in figure 3-1.

4.2.3 The temperature of the chamber was raised to 125 (+5, -0)°F and maintained for 72 (+2, -0) hours. The temperature of the test specimen was allowed to stabilize at this temperature.

4.2.4 When temperature stabilization was reached, a functional test was performed as specified in paragraph 3.2.6 of section III. Following completion of the 72-hour high temperature period, specified in 4.2.3, the specimen was allowed to return to room ambient temperature.

4.2.5 When the specimen had reached room ambient temperature, a functional test was performed as specified in paragraph 3.2.6.

4.3 TEST RESULTS

4.3.1 The specimens were successfully subjected to a high temperature of 125°F.

4.3.2 The specimens successfully met the functional test requirements during and after the high temperature exposure.

4.4 TEST DATA

The data presented in table 4-1 were recorded during the high temperature test. The data presented in table 4-2 were recorded after the high temperature test.

Table 4-1. Functional Test Data Obtained During High Temperature Test

Specimen	Trial	Cracking Pressure (psig)	Reseating Pressure (psig)	Leakage Rate (bpm)
1	1	89.0	83.0	0
	2	92.0	86.0	
	3	90.0	84.0	
2	1	89.5	83.0	0
	2	89.0	83.0	
	3	89.0	83.0	

Table 4-2. Functional Test Data Obtained After High Temperature Test

Specimen	Trial	Cracking Pressure (psig)	Reseating Pressure (psig)	Leakage Rate (bpm)
1	1	97.0	90.0	0
	2	97.0	90.0	
	3	96.0	89.0	
2	1	90.0	82.0	0
	2	93.0	86.0	
	3	91.0	84.0	

SECTION V

SURGE TEST

5.1 TEST REQUIREMENTS

5.1.1 Each test specimen shall be subjected to 10 pressure surges. Each surge shall consist of pressurizing the specimen inlet port from 60 psig to 110 per cent of cracking pressure within 100 milliseconds.

5.1.2 The test medium shall be LN_2.

5.1.3 A functional test as specified in section III shall be conducted after 10 surge cycles.

5.2 TEST PROCEDURE

5.2.1 The test setup was assembled as shown in figures 5-1 and 5-2 using the equipment listed in table 5-1.

5.2.2 Regulator 4 was adjusted until LN_2 tank 6 was pressurized to 110 per cent of the specimen cracking pressure. The LN_2 tank pressure was monitored on pressure gage 5.

5.2.3 Hand valves 7 and 9 were opened. Solenoid valve 8 was actuated and the specimen was pressurized to 110 per cent of cracking pressure within 100 milliseconds. The pressure and the pressure rise rate were monitored using transducer 10 and oscillograph 12.

5.2.4 The specimen pressure was vented to 60 per cent of cracking pressure by actuating and deactuating solenoid valve 11.

5.2.5 The specimen was subjected to 10 pressure surges from 60 to 110 per cent of cracking pressure by alternately actuating and deactuating solenoid valves 8 and 11.

5.2.6 Upon completion of the surge test, the specimen was subjected to the functional test specified in section III, using LN_2.

5.3 TEST RESULTS

5.3.1 The specimens were successfully subjected to 10 pressure surges from 60 psig to 110 per cent of cracking pressure within 100 milliseconds.

5.3.2 The specimens successfully met the functional test requirements following 10 surge cycles.

5.4 TEST DATA

A typical surge test waveform is shown in figure 5-3. Functional test data presented in table 5-2 were recorded following the surge test.

Table 5-1. Surge Test Equipment List

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Test Specimen	Manning, Maxwell, and Moore	1970C Special		1- by 1½-inch relief valve
2	GN_2 Pressure Source	CCSD	NA	NA	3000-psig
3	Pressure Gage	Duragauge	NA	200586-E	0-to 5000-psig ±1% FS Cal date 2-9-67
4	Pressure Regulator	AerValco	10400-C	NA	0- to 300-psig output
5	Pressure Gage	Duragauge	NA	200586-G	0-to 300-psig ±1% FS Cal date 2-9-67
6	LN_2 Tank	Ronan and Kunzl Inc.	LOY 15	106	15-gallon
7	Hand Valve	Control Components Inc.	NA	NA	½-inch
8	Solenoid Valve	Asco Co.	WP 826812 LT	NA	3/4-inch
9	Hand Valve	Control Components Inc.	NA	NA	¼-inch
10	Pressure Transducer	Consolidated Electrodynamics Corp.	NA	95-1116-B	0-to 100-psig Cal date 12-22-66
11	Solenoid Valve	Asco Co.	WP-826812 LT	NA	½-inch
12	Recording Oscillograph	C. E. C.	NA	012586	Cal date 1-28-67
13	Relief Valve	Anderson Greenwood	3TS44-2	NA	½-inch

Table 5-2. Functional Test Data Following Surge Test

Specimen	Trial	Cracking Pressure (psig)	Reseating Pressure (psig)	Internal Leakage (bpm)
1	1	96.0	89.5	1
	2	96.0	89.5	
	3	96.0	89.5	
2	1	96.0	90.0	3
	2	97.0	90.5	
	3	97.0	90.5	

Note: All lines ½ inch.
Refer to table 5-1 for item identification.

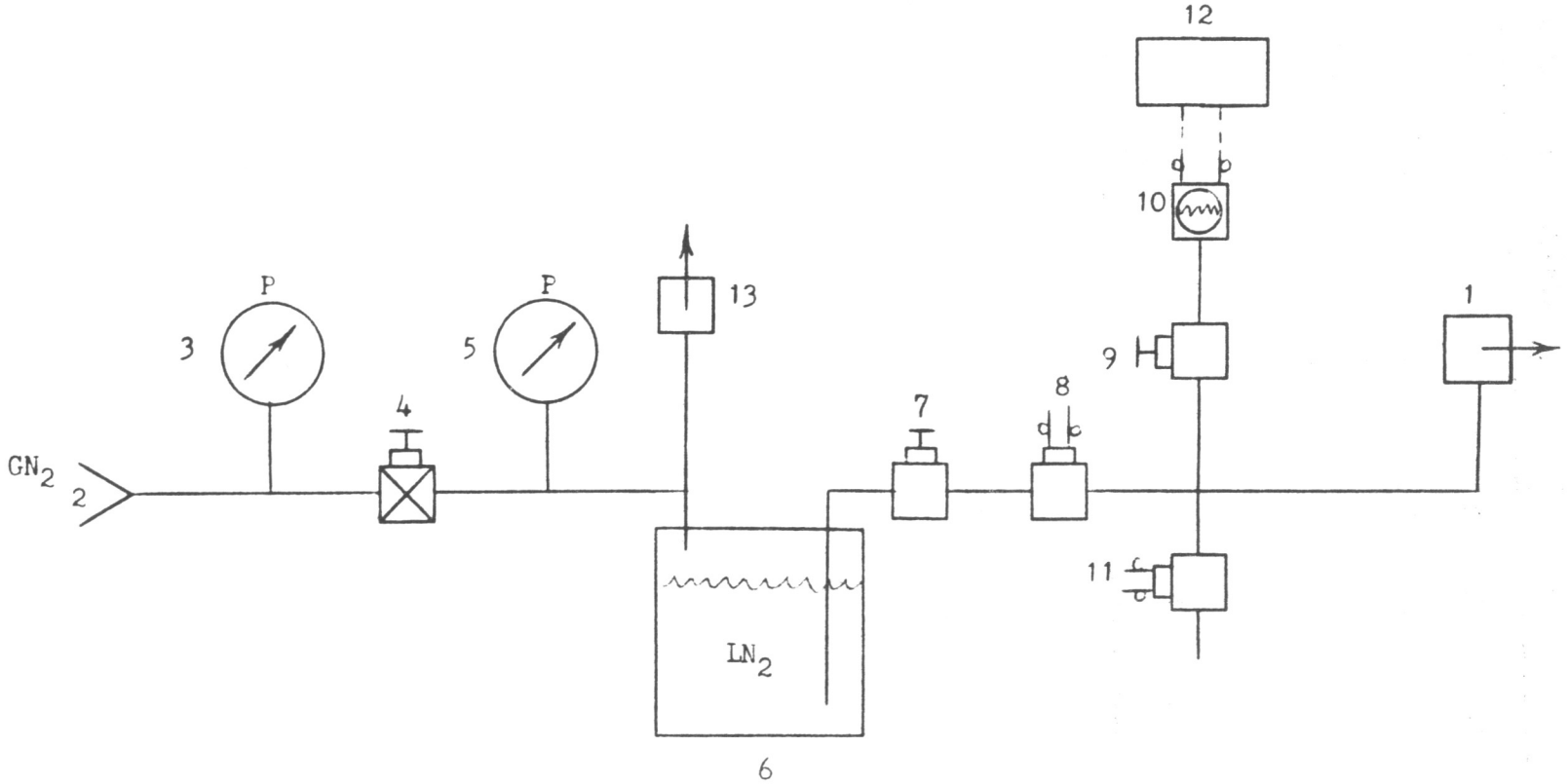


Figure 5-1. Surge Test Schematic

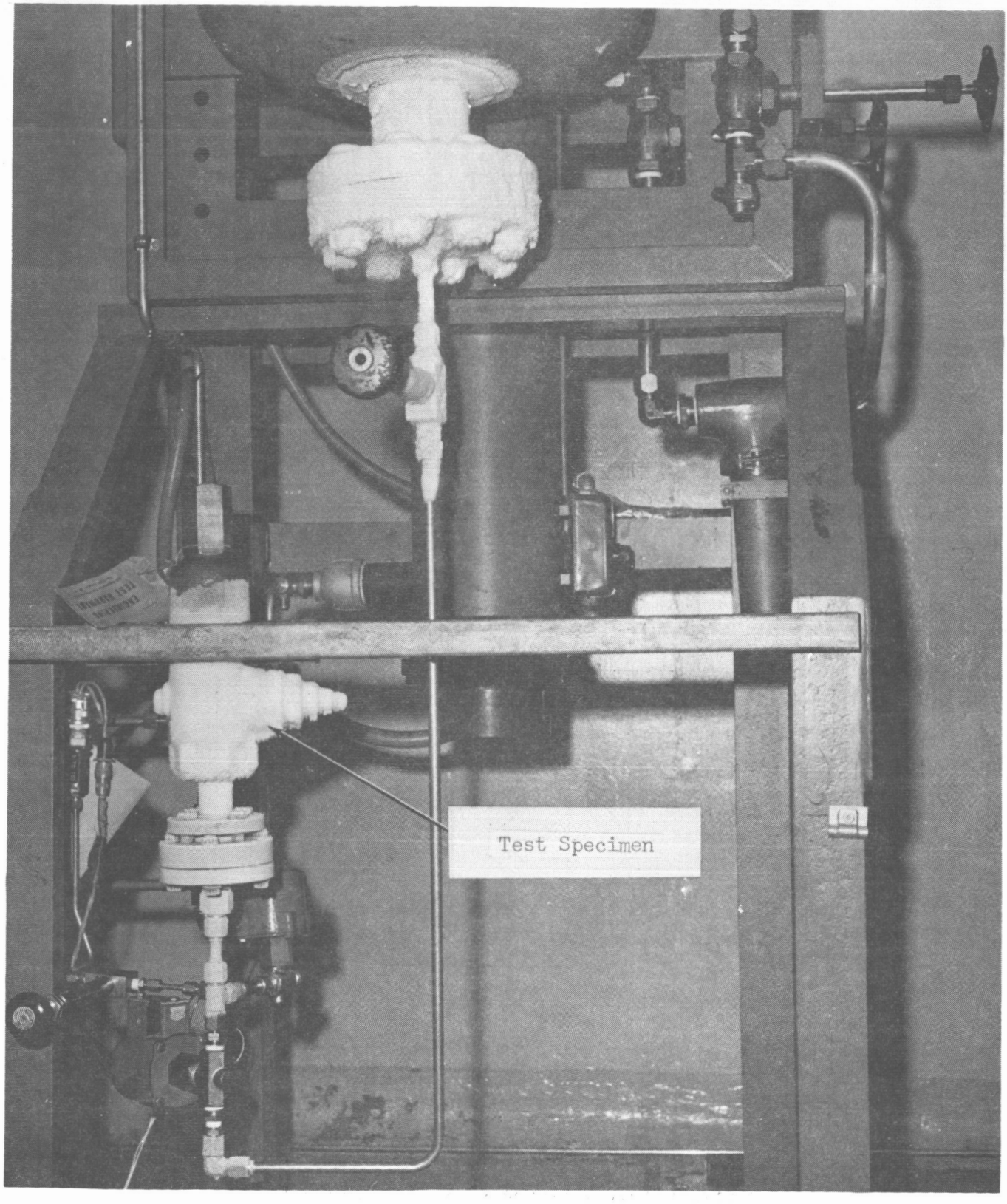


Figure 5-2. Surge Test Setup

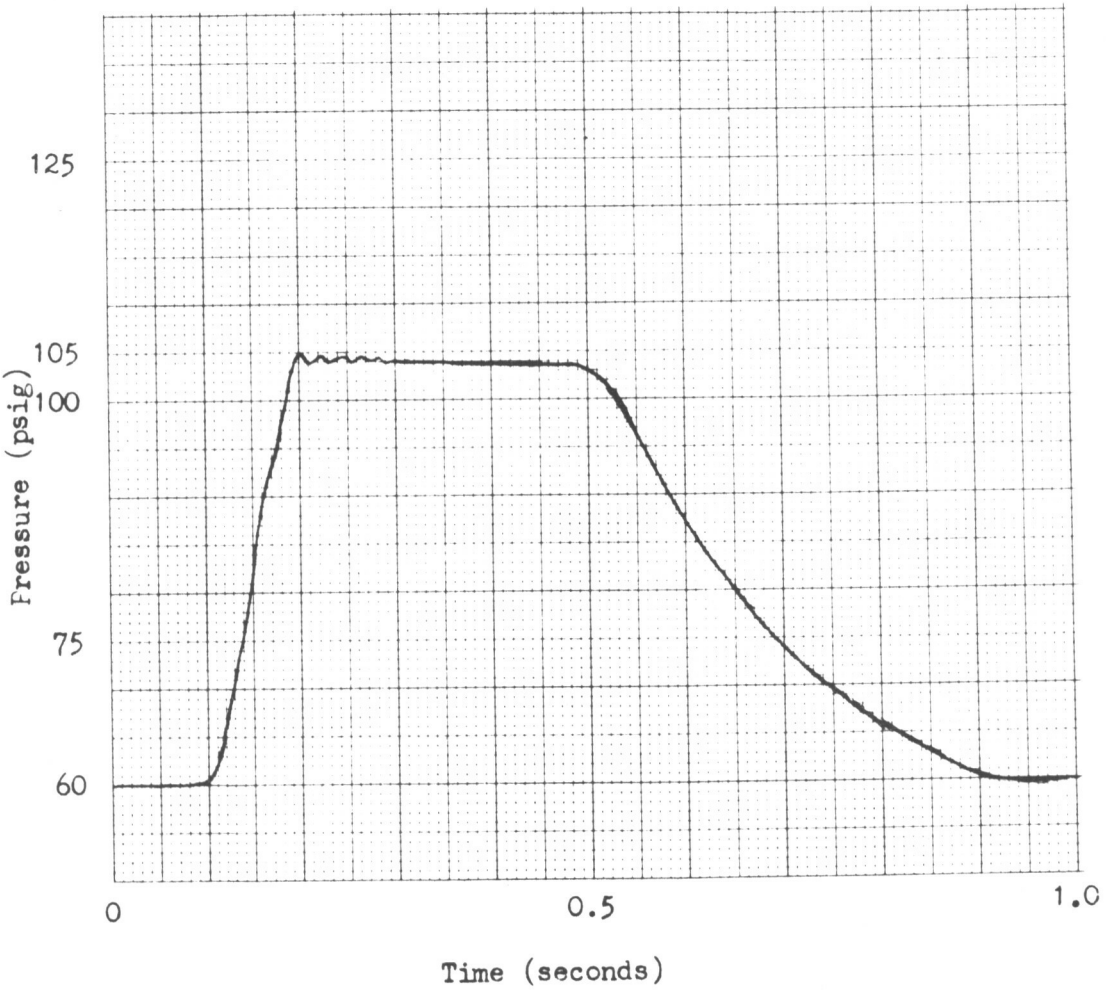


Figure 5-3. Typical Surge Test Waveform

SECTION VI

CYCLE TEST

6.1 TEST REQUIREMENTS

6.1.1 Each cycle shall consist of pressurizing the test specimen from 50 to 105 per cent of the cracking pressure and then depressurizing the test specimen to zero.

6.1.2 The test specimen shall be subjected to 500 cycles.

6.1.3 The test medium shall be LN_2.

6.1.4 The test specimen cracking pressure shall be reset to 90 (+3, -0) psig prior to cycle testing to check the specimens for conformance to specification 75M17763 HRV-9 during all subsequent functional tests.

6.1.5 Internal leakage measured during the functional test shall be measured in sccm. The maximum allowable leakage is 10 sccm.

6.1.6 The test specimen shall be subjected to a functional test, as specified in section III, after 100 cycles and each 100 cycles thereafter.

6.2 TEST PROCEDURE

6.2.1 Specimens 1 and 2 were set to relieve at 90 (+3, -0) psig, using GN_2 at ambient temperature.

6.2.2 The test setup was assembled as shown in figure 5-1 using the equipment listed in table 5-1.

6.2.3 Regulator 4 was adjusted until LN_2 tank 6 was pressurized to 105 per cent of test specimen cracking pressure. The LN_2 tank pressure was monitored using pressure gage 5.

6.2.4 Hand valves 7 and 9 were opened. Solenoid valve 8 was actuated and the specimen was pressurized to 105 per cent of cracking pressure. The pressure was monitored using transducer 10 and oscillograph 12.

6.2.5 The specimen pressure was vented to 50 per cent of cracking pressure by actuating and deactuating solenoid valve 11.

6.2.6 The specimen was subjected to 500 pressure cycles from 50 to 105 per cent of cracking pressure by alternately actuating and deactuating solenoid valves 8 and 11.

6.2.7 A functional test was conducted on the specimen as specified in section III after each 100 cycles. The cracking pressure and internal leakage were checked for conformance to drawing 75M17763 HRV-9.

6.3 TEST RESULTS

6.3.1 The test specimens were subjected to 500 cycles.

6.3.2 The cracking pressure of both specimens was above the specified maximum of 93 psig when measured, using LH_2 as the test medium, following every 100 cycles. The high cracking pressures are attributed to the low temperature of the test specimens. Following 500 cycles, and after the specimens had reached ambient temperature, the cracking pressure of both specimens was checked again with GN_2. The cracking pressures of both specimens were within the specified range of 90 (+3, -0) psig.

6.3.3 Internal leakage test results were satisfactory following each 100 cycles.

6.4 TEST DATA

6.4.1 The test data presented in table 6-1 were recorded after each 100 cycles of the cycle test.

6.4.2 Following 500 cycles, and after the specimens had reached ambient temperature, the cracking pressure of the specimen was checked using GN_2. The cracking pressure of specimen 1 was 90.1 psig and the cracking pressure of specimen 2 was 90.4 psig.

Table 6-1. Functional Test Data Obtained After Each 100 Cycles of Cycle Test

Number of Cycles	Specimen	Trial	Cracking Pressure (psig)	Reseating Pressure (psig)	Leakage Rate (sccm)
100	1	1	97.5	91.5	0
		2	100.0	93.0	
		3	100.0	93.0	
	2	1	95.0	89.0	0
		2	96.0	90.0	
		3	96.0	89.5	
200	1	1	103.0	96.0	10
		2	102.0	95.5	
		3	103.5	96.0	
	2	1	98.5	91.0	0
		2	98.5	91.0	
		3	98.0	91.0	
300	1	1	103.0	96.0	0
		2	103.0	96.0	
		3	104.0	96.5	
	2	1	96.0	89.0	6
		2	96.0	89.0	
		3	96.0	89.0	
400	1	1	98.0	91.5	0
		2	98.0	91.5	
		3	98.5	91.5	
	2	1	94.5	89.0	0
		2	95.0	89.0	
		3	95.0	89.0	
500	1	1	93.0	87.0	5
		2	92.5	86.5	
		3	102.0	95.0	
	2	1	95.0	89.0	0
		2	95.5	89.0	
		3	94.5	88.0	

SECTION VII

PROOF PRESSURE TEST

7.1 TEST REQUIREMENTS

7.1.1 The test specimen shall be subjected to a proof pressure of 135 psig for 5 minutes with GN_2 as the test medium.

7.1.2 The specimen shall be checked for leakage and distortion.

7.2 TEST PROCEDURE

7.2.1 The test setup was assembled as shown in figure 7-1 using the equipment listed in table 7-1.

7.2.2 All hand valves and regulator 8 were closed. The inlet port of hand valve 4 was pressurized to 200 psig with the GN_2 pressure source.

7.2.3 Hand valve 4 was opened and the 200-psig supply pressure was monitored on pressure gage 7.

7.2.4 Hand valve 9 was opened. The inlet and outlet ports of the specimen were pressurized to 135 psig by adjusting regulator 8. The specimen pressure was monitored on pressure gage 11.

7.2.5 Hand valve 9 was closed. Leakage from the test specimen was checked for 5 minutes by observing pressure gage 11 for an indication of a drop in specimen pressure.

7.2.6 The specimen pressure was recorded at the beginning and at the end of the 5-minute period.

7.2.7 Upon completing the leakage check, hand valve 9 was opened. The specimen pressure was relieved by closing regulator 8 and opening hand valve 12.

7.3 TEST RESULTS

The specimens did not leak and there was no evidence of distortion.

7.4 TEST DATA

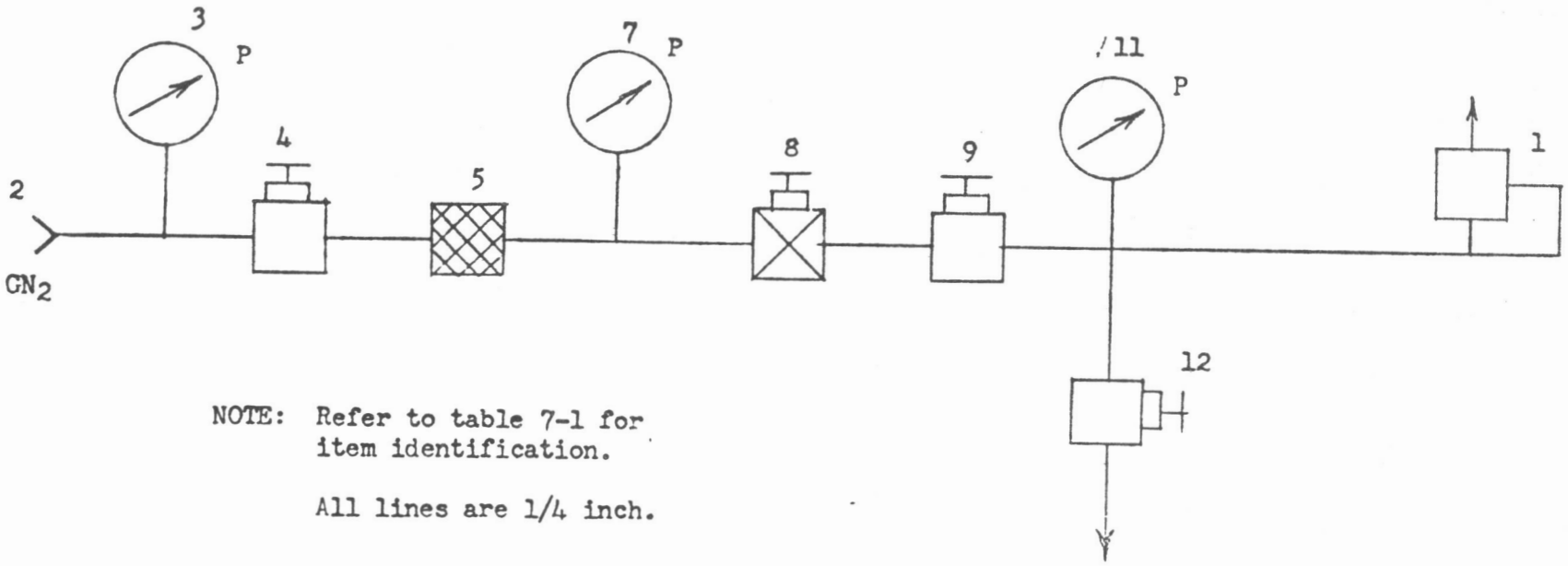
The data presented in table 7-2 were recorded during the proof pressure test.

Table 7-1. Proof Pressure Test Equipment List

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Test Specimen	Manning, Maxwell, and Moore	1970C Special		1- by 1½-inch relief valve
2	GN_2 Pressure Source	CCSD	NA	NA	3200-psig
3	Pressure Gage	Duragauge	NA	200617-F	0-to 5000-psig ±1.0% FS Cal date 12-24-66
4	Hand Valve	Robbins Aviation, Inc.	SSKG-250-4T	NA	¼-inch
5	Filter	Bendix	S-13460-16-B-0	NA	2-micron
7	Pressure Gage	Duragauge	NA	200617-G	0-to 5000-psig ±0.5% FS Cal date 12-24-66
8	Pressure Regulator	Tescom Corp.	26-1003	1001	0-to 500-psig
9	Hand Valve	Robbins Aviation, Inc.	SSKG-250-4T	NA	¼-inch
11	Pressure Gage	Duragauge	NA	200617-R	0-to 3000-psig ±0.1% FS Cal date 12-24-66
12	Hand Valve	Robbins Aviation, Inc.	SSKG-250-4T	NA	¼-inch

Table 7-2. Proof Pressure Test Data

	Specimen 1	Specimen 2
Initial Pressure	135 psig	135 psig
Pressure after 5 minutes	135 psig	135 psig
Leakage	None	None
Distortion	None	None



NOTE: Refer to table 7-1 for item identification.

All lines are 1/4 inch.

Figure 7-1. Proof Pressure Test Schematic

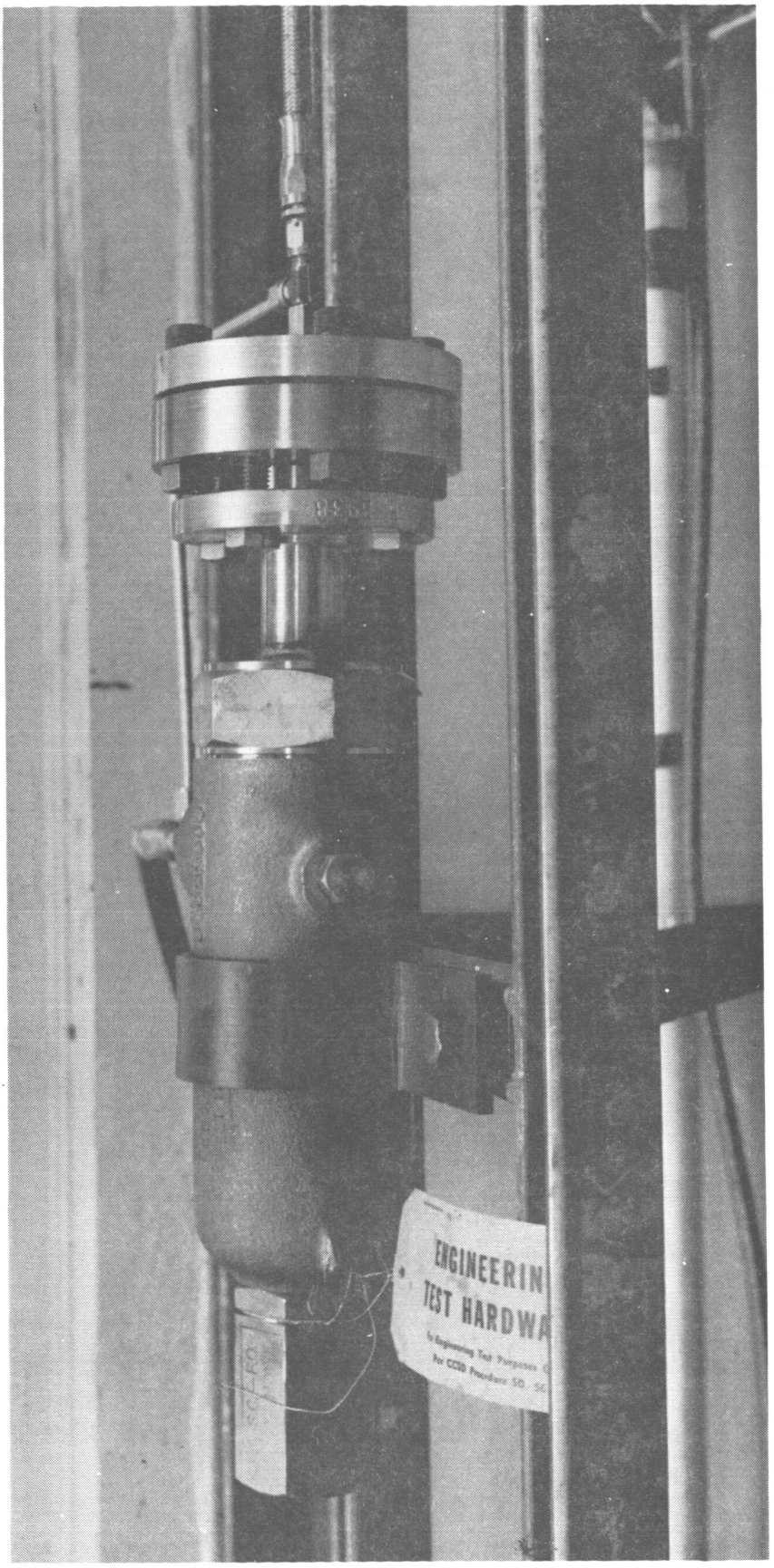


Figure 7-2. Proof Pressure Test Setup

APPROVAL

TEST REPORT

FOR

RELIEF VALVE, 1- BY 1½-INCH, 100-PSIG

Manning, Maxwell, and Moore Model Number 1970C Special

NASA Drawing Number 75M17763 HRV-9

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